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Suggested approach to the study of the communication of conceptually structured understandings

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A SUGGESTED APPROACH TO THE STUDY OF THE COMMUNICATION OF CONCEPTUALLY STRUCTURED UNDERSTANDINGS

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CHAPTER ONE

INTRODUCTION TO THE PROBLEM

The field of human communication theory is broad and interdisciplinary in character. Investigators in the area draw upon many fields in efforts to describe and elucidate the processes involved in man's communicative activities. This is as it should be, for communication not only makes human society possible as we know it, but, in a sense, society is the result of myriad communicative exchanges. Looked at in another way, the processes of inter-human communication are the counterpart of human, symbolic thought. In view of the above, it is small wonder that questions concerning the nature and function of language have become of increasing importance to many areas of professional interest, including linguistics, philosophy, psychology, sociology, political science, rhetoric, and group dynamics--to name but a few from a long list.

The purpose of the present work is to set forth an approach to the study of one aspect of human communicative activity. The questions to be explored in the following pages have to do with the nature of human understanding. The central question to be examined is: what is there about human, symbolic understandings which makes them capable of being communicated?

At this point it might be well to make clear that the scope of

the present study does not extend to all of man's communicative behavior. The communication of aesthetic or moral values, for example, is deliberately excluded from consideration, as well as any understanding of things or events in the world that is not mediated symbolically. Thus the whole area of non-symbolic, gesturally communicated meanings between individuals is not treated.

In the present work, attention is centered on one dimension of man's communicative behavior: the communication between individuals of symbolically structured conceptual frameworks. The problem is further limited to situations in which one individual is presumed to have a complexly structured conceptual framework (i.e., an interconnected system of concepts by which he orders and coordinates his experience) and the intention of communicating this framework to another individual.

The relationship between human understanding and conceptual frameworks to be developed in what follows is that an individual's use of a conceptual framework constitutes his understanding. The term "human understanding," as it will be employed in the present work, is to be thought of as a psychological system by means of which some portion of an individual's experience is ordered and made a part of his working conceptualization of reality. The nature of such understandings will be one of the principal problems to be explored in the following chapters. However, bearing in mind that most of the ideas being used are to be developed in later chapters, attempt might still be made to give some more explicit notion of the type of communication to be examined later. Such an attempt follows below.

Communication, as it will be discussed in the present work,

should be thought of as the transfer of understandings via the communication of conceptual frameworks. In accordance with the above stated relationship between understandings and conceptual frameworks, communication as the transfer of understandings might be formulated as follows: individual A has an understanding which consists in the use of a particular conceptual framework; when communicated to individual B, B's understanding of A may be taken as his achieved ability to use the conceptual framework communicated by A. Viewed in this way, it can be seen that the result of the communicative exchange is to effect a change in B's ways of ordering the world--or at least to increase the ways in which he may choose to order his understanding of the world. Furthermore, since as was stated we may regard an individual's ordered understanding of the world as a psychological system, we may define communication as the effect of a message upon the psychological system of a receiver. A revised definition of communication which includes this last view of the process would be: communication is the transfer of understandings via the communication of conceptual frameworks which result in a reordering of a person's psychological system or understanding.

The usefulness of the above formulation, of course, depends upon our abilities to unravel and solve problems concerning the nature of understanding when it is conceived of in this way. Fortunately, what seems a very useful approach to the problem of dealing with understanding when it is thought of as the use of conceptual frameworks is to be found in the area of the philosophy of science. The approach consists in efforts on the part of writers in the area to explicate the scientist's

understanding of the world. Three writers, Stephen Toulmin,[1] David Hawkins,[2] and Ernst Cassirer,[3] have worked out notions of the nature of scientific understanding in terms of strikingly similar conceptions as a symbolic restructuring of relevant concepts. Scientific discovery as explicated by Toulmin, Hawkins and Cassirer has as its result nothing more than ordinary human understanding, describable as a comprehension of a particular conceptual framework.

At this time it might be well to insert a comment on the approach to the general subject of language usage employed in the present study. As already indicated, no pretense is made of treating definitively the whole subject of language usage. It is the writer's goal in the following chapters to create a synthesis of views on the subject of what gets communicated in the communication of conceptually realized understandings. The writers discussed in the following chapters are selected because their views seem capable of being fitted into the kind of synthesis desired, and because, although far from being of a piece, their views seem in varying degrees compatible with the desired synthesis. It thus might be said that the fitting together of selected views on language usage is as much a function of the desire of the writer to see them synthesized as it is a function of some commonality of views and interests on the part of the writers selected. The efficacy of

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[1]Stephen Toulmin, The Philosophy of Science (New York: Harper and Row, Publishers, 1953).

[2]David Hawkins, The Language of Nature (San Francisco: W.H. Freeman and Co., 1964).

[3]Ernst Cassirer, An Essay on Man (New Haven: Yale University Press, 1944), and The Philosophy of Symbolic Forms (Three Vols., New Haven: Yale University Press, 1953), I.

this approach must of course depend upon whether or not the obtained synthesis aids in an explanation of the communication of complex, conceptual frameworks.

Turning now to an attempt to make clearer how some better understanding of the nature of the scientist's working conceptions could aid in setting forth a workable view of communication, we might briefly compare our usage of our own everyday formulations of things with the scientist's usage of theoretical formulations. As will become clearer in a later discussion of scientific discovery, the scientist creates or sees the relevance of an already present structured way of seeing things, which is then applied to the world. His structured way of seeing things constitutes his theory. The scientist is trained to be very self-conscious in his use of theoretical formulations and is sophisticated concerning the relations between his theories and observational facts. We, in our everyday usage of culturally transmitted and individually created formulations of things are not so self-conscious about relations between them and the occurrance of events in the world which could be taken as confirming them. We do not, to use a view expounded by Toulmin (and one that will receive considerable attention later), commonly see confirming instances as evidence that our working conceptualizations of things can be applied in these cases.[4] On the contrary, we commonly see them as just another instance of "the way things are."

We might note that there is often a great difference in the "level of reality" attributed to working formulations on the part of

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[4]Toulmin, 112-113.

scientists and on the part of people in their everyday lives. Yet, in both cases the individuals involved are making use of conceptually structured ways of looking at things--i.e., conceptual frameworks, and in each case this usage goes to make up an understanding of the world. A later discussion of the individual's total understanding as put forward by Kenneth Boulding[5] will help support the view that our total understanding is a composite of many conceptual frameworks as they have been discussed thus far, loaded with valuations and that sometimes they are only partial insights and inferences. In the present work, interest will center on the completely realized conceptual frameworks within a person's total understanding, minus their valuative loading. To attempt more would be to go beyond the scope of the present study.

What is sought is a general notion of understanding to use in explicating what gets communicated in an exchange between two people. The relative clarity of the scientist's understanding gives insight into the nature of understanding in general and, therefore, is useful to examine. If a notion of <u>what</u> is communicated is developed, it is assumed that we may then turn to an examination of <u>how</u> it is communicated with some better, more workable notion of how to deal with this latter problem.

We might now turn attention to possibilities of relating the conception of communication as the transfer of understandings to other approaches to the subject of information transfer. Other investigators concerned with human communication have recognized the need for some

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[5]Kenneth Boulding, <u>The Image</u>, (Ann Arbor: University of Michigan Press, 1956).

explanation of what goes on within sources and receivers of information. They have also recognized the need for an explanation of what constitutes the meaningful content of messages. However, rather than attempt to describe and discuss all of these alternative approaches to these problems, it seems better to show how the present approach conforms to what seems to the writer to be the most closely related current statements by theorists of meaning on the subject of information transfer. In each case reasons will be given for departing from these approaches.

The proposed conception of communication is not completely without precedent in the area of theorizing about human communication. However, it does seem to be a conception that has not received very extensive treatment. Upon examination it can be seen to conform, although somewhat loosely, to the philosopher Charles Morris' conception of the pragmatic aspects of language usage. As Morris defines it, " 'Pragmatics' is that portion of semiotic which deals with the origin, uses, and effects of signs within the behavior in which they occur."[6] In the following chapters the concern will be almost exclusively with symbols and not signs. However, once this distinction is made clear, the area of language usage set forth by Morris as the pragmatic dimension seems adequately to describe the area of present interest. Furthermore, as Charles L. Stevenson has pointed out, it is possible to identify the pragmatic aspects of language usage with the psychological reactions of the users of the language.[7] In other words, pragmatics, in Stevenson's

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[6]Charles Morris, Signs, Language and Behavior (New York: Prentice-Hall, Inc., 1946), 219.

[7]Charles L. Stevenson, Ethics and Language (New Haven: Yale University Press, 1944), 42.

version, is concerned with the effects of messages upon the psychological systems of the participants of a communicative exchange. This latter formulation of pragmatics, it should be noted, fits quite well with the previously given formulation of communication. To reiterate, in the communication of conceptually structured understandings, we are concerned with the effects of messages upon a psychological system which is the receiver's structured understanding of the world.

As stated, the pragmatic dimension of language usage has received relatively little attention from theorists. What Morris provides is more a statement of where such a conception would fit within a total framework than a detailed description of what such a conception would be and now it would function. Morris' treatment is further limited by the fact that he attempted to make his science of semiotic so broad. His efforts to treat all linguistic behavior as sign behavior might account for his attempt to reduce symbolic behavior to sign behavior--i.e., something explainable in terms of sign behavior--and make it treatable in terms of a contiguity-reinforcement theory of learning. As Charles Osgood, et. al., have pointed out, Morris' attempt to anchor semiotic in behavioral learning theory runs into the danger that the response dispositions he invokes to explain symbolic behavior may serve as "a mere surrogate for 'idea' without further explication."[8]

It might also be noted that psychological systems, of which our use of conceptually structured understandings is an example, have the

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C.E. Osgood, G. Suci, and P. Tannenbaum, "The Logic of Semantic Differentiation," Psycholinguistics, S. Saporta, ed. (New York: Holt, Rinehart, and Winston, 1961), 286.

status of mediating constructs--i.e., they are hypothetical inner states. With the advent of Watsonian Behaviorism and the widespread adoption of an operational methodology and orientation to research, inner states fell into disfavor and have only recently become once again scientifically respectable. However, inner states as mediating constructs have proven ever more useful to behavioral scientists of late--even though, as Cronbach and Meehl have stated, they are often couched in an operational phraseology which belies their usage.[9] Its lack of scientific respectability might account for theorists' reluctance to investigate the nature of understanding. The regained status of inner states, i.e., meanings, response tendencies, habit family hierarchies, second signal systems, excitatory potentials, attitudes, etc., as mediating constructs is an interesting subject in itself, but one that has received considerable attention elsewhere. The reader interested in pursuing the subject further is referred to discussions by Cronbach and Meehl,[10] Rulon Wells,[11] and Charles L. Stevenson.[12]

Even when employing mediating constructs in treating meaning, one finds a prevalent tendency to deal with aspects of meaning rather far down the conceptual ladder, i.e., in terms of the relation between meaning and referent. Theorists taking this approach, for example,

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[9] L. Cronbach and P.E. Meehl, "Construct Validity in Psychological Tests," Psychological Bulletin, LII, May 1955, 300.

[10] Ibid., 281-302.

[11] Rulon Wells, "Meaning and Use," Psycholinguistics, 269-283.

[12] Stevenson.

Charles Osgood, et. al.,[13] and Roger Brown and Don E. Dulaney,[14] do not treat meanings that are represented by symbols as having a created, contextual nature, i.e., as being meaningful within the structure of a context. They seem far too concerned with finding its "elements" and its ways of coming to be associated with a referent. For contiguity-reinforcement theorists the meaning of a symbol seems little more than an arbitrary connection between a label and a referent which is made because of temporally contiguous reward.

The level of meaning commonly treated by a contiguity-reinforcement theory of symbolization will be dealt with in the following chapters in a fashion expounded by Joseph Church[15] and Ernst Cassirer.[16] In the views of these theorists, meaning at this level is first simply the infant's reaction to a non-linguistic interpretation of its environment. Later symbols come to represent these meanings.

Here it might be well to take note of the fact that the usage of condeptual frameworks as they are presently employed is at least three stages away from meaning at the first non-linguistic level. In the meaning hierarchy to be developed in the following chapter, there are first such non-linguistic interpretations, then symbols, concepts, and finally conceptual frameworks.

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[13] C.E. Osgood, et. al., 300.

[14] Roger Brown and Don E. Dulaney, "A Stimulus-Response Analysis of Language and Meaning," Language Thought and Culture, Paul Henle, ed. (Ann Arbor: University of Michigan Press, 1958), 49-98.

[15] Joseph Church, Language and the Discovery of Reality (New York: Random House, 1961).

[16] Cassirer, Essay . . . and Philosophy . . ., I.

The individual's use of symbols and concepts in conceptually structuring his experience is of vital importance to the present approach to the study of the communication of understandings. Yet it seems to be a methodological limitation of a contiguity-reinforcement approach that it restricts the theorizer to a referential orientation to meaning. As Osgood et. al. admit in their discussion of semantic differentiation, the broader scope of the theory of the semantic differential was obtained at the sacrifice of a direct tie-in with the learning theory conception of meaning which was desired to support it.[17] It would seem that theorists treating meaning with a contiguity-reinforcement theory have a very long road to travel before reaching a vantage point where they will be able to deal with the use of symbols in creatively treating experience to obtain new conceptual orderings of the world. As Heinz Werner and Bernard Kaplan have stated,

> It seems to us that it is well-nigh impossible to account for symbol-realism in terms of a contiguity-reinforcement theory of symbolization, that is, in terms of a theory that reduces symbols to signs. Neither animals nor humans, insofar as they respond to entities qua signs, confuse the sign with what it indicates or foreshadows: no conditioned dog treats a bell or buzzer as if it were of the same substance as the food it signalizes or indicates; no normal man opens his umbrella to protect himself against clouds or thunder as signs of rain.[18]

The referential function of symbols is thus seen to be only a part of their nature; their representational function is something that will be expounded upon in later discussions following the lead of Cassirer.

Thus far a conception of communication as the transfer of under-

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[17] Osgood, et. al., 300.

[18] Heinz Werner and Bernard Kaplan, Symbol Formation (New York: John Wiley and Sons, Inc., 1963), 36.

standings has been put forward. The position has been taken that the process might be fruitfully viewed as one involving, not the direct communication of understandings, but rather the communication of conceptual frameworks which, in their comprehension and incorporation into the psychological system of the receiver, amount to an understanding on the part of the receiver.

To meet problems encountered in explicating the process in this suggested way, it has been proposed that the use of conceptual structuring as it is employed in science and is discussed by three philosophers of science might serve in elucidating what gets communicated. The suggested usage of conceptual frameworks has been shown to conform in some ways with Morris' development of the pragmatic dimension of language usage. However, it has also been shown that there is a certain amount of difficulty in dealing with the pragmatic dimension of language usage in the way that Morris advocated. An alternative method, following the conceptions of language development advanced by Church and Cassirer, has been suggested. In the following chapter, a meaning hierarchy will be developed in which symbols are created out of non-linguistic meanings, then concepts and finally conceptual frameworks.

CHAPTER TWO

THE CONCEPTUAL STRUCTURING OF EXPERIENCE THROUGH SYMBOLS

In this chapter we will be concerned with the general subject of language acquisition as a necessary stage in the individual's creation of conceptual realities. The developmental psychology of Joseph Church will be drawn upon up to the point of the attaining of symbolic meanings.[1] At this point attention will be turned to a discussion of the subject by Cassirer,[2] and continued to the desired conception of symbolic systems of inter-related concepts.

Meaning Prior to Language

In his discussion of the subject, Joseph Church begins with the assumption that the child is first a perceiver of meaning.[3] The child first perceives only personally meaningful objects.

> Those objects and those properties of objects, stand out which offer some relevance to the child in terms of promise of threat or concrete action . . . . The child perceives only personally meaningful objects, and . . . what he perceives is not so much the objects as their meanings. Developmentally and microgenetically, meanings precede objects in perception.[4]

Church terms perception at the above stage "physiognomic perception."

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[1] Church, Language and the Discovery of Reality.

[2] Cassirer, Essay and Philosophy.

[3] Church, 4-5.

[4] Ibid.

The child perceives things, but he perceives them in terms of their "physiognomic-meaning qualities rather than their objective attributes."[5] An object's objective properties, such as size, shape and color, Church contends, are submerged in its general physiognomy and do not emerge as isolable perceptual dimensions until almost age two.[6]

Physiognomic perception is not something restricted to the child's first perceptual experience. Church further contends that this type of perception continues into adulthood.

> It is only when we scrutinize an object analytically or judgmentally or contemplatively that we cease to perceive physiognomically. Unless we have some reason to analyze an object we may live with it for years without ever noting many of its readily perceptible objective properties.[7]

The presence of physiognomic perception, it might be noted, is probably less noticeable than it might be by virtue of the fact that few of the things man views have not at one time or another been symbolically treated, i.e., incorporated into a reality which is a symbolic formulation of things. Furthermore there is the fact that, as Church points out above, to think <u>about</u> an object, i.e., to comtemplate it, is to cease to regard it physiognomically. Another fact which will be important in future discussions of language usage should be noted in Church's above discussion. It can be seen that, initially, the child experiences the world <u>directly</u>, an object is first simply an "it." This idea is one that will be useful later, following the treatment of the subject by Cassirer.

The meanings which the child learns through physiognomic perception are put together in terms of a "schema." Church states, "The baby's

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[5] <u>Ibid</u>. [6] <u>Ibid</u>. [7] <u>Ibid</u>., 6.

experience--what he learns--is consolidated as knowledge, and the most fundamental form of knowledge is the schema."[8] Church defines the schema both logically and psychologically. Logically, a schema is an "implicit principle by which we organize experience."[9] By this he means that, logically, schemata incorporate both recognition and implicit classification, plus generalizations from experience (e.g., bottles, toys, etc., all fall one direction, down), all of which are implicit until made explicit through symbolic or linguistic formulation. Church further says,

> Psychologically . . . we become sensitive to the way things are constituted and act, so that we perceive the environment as coherent and orderly, in ways that the adult can make explicit as principles but that, for the baby, exist only in the sense that here is the world and things are under pretty good control.[10]

From the above definition, it can be seen that Church's psychological use of schemata is that of a descriptive term. Schemata are used in sorting out the environment. As we have seen, they are learned in terms of physiognomic perception--at least at first--and together they go to make up the child's stock of non-symbolic meanings with regard to the world.

Church goes on to say that schemata can be either very general or very specific. The most general and all-pervasive schema is our orientation to a "broad spatial and temporal and situational framework."[11] Our sense of the enduring identity of physical objects is embodied in this schema. Schemata continue to develop and change throughout life, and they will be a subject of particular interest later on in a discussion of general orientational frameworks. At present our interest in them centers in the fact the child's preverbal meanings are incorporated in schemata. The

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[8] Ibid., 36. [9] Ibid. [10] Ibid., 36-37. [11] Ibid., 37.

schematization of objects occurs with learning their enduring identity--their constancy of size, shape, color,and brightness.[12] Space is schematized pragmatically in terms of direct experience, while time is similarly dealt with in sorting out the routine occurrences of the day, feeding time, bath time, etc.

Up to this point we have been concerned with showing that the child's preverbal experience is one of meaningfully sorting out the environment, that he comes to the learning of language with meanings for which language will provide a new mode of expression. However, in this chapter we are not directly concerned with the child's learning of language. That subject has already been adequately covered by Church in his own exposition of the subject. His views on the child's non-linguistic world were discussed because they will make more readily understandable the views of Cassirer on the general subject of the development or acquisition of language in what follows. To accept Cassirer's position, it is necessary to conceive of the individual as in some measure meaningfully perceiving the world, and, in Church's view, the child is engaged in just such meaningful perception from the start.

Symbolic Structuring

For Cassirer, the key to the understanding of man lies in his use of the symbol. The view of man set forth by Cassirer in his Essay on Man and in his Philosophy of Symbolic Forms is that man experiences little direct confrontation with the world; man's view of the world is one that is symbolically mediated. In the man who has had the benefit of culture,

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[12] Ibid., 41.

there is a world of symbolic meaningfulness which is then available to use by the individual in understanding both himself and his culture. Man lives in a new dimension of reality:

> Man has, as it were, discovered a new method of adapting himself to his environment. Between the receptor system and the effector system, which are to be found in all animal species, we find in man a third link which we may describe as the symbolic system. This new acquisition transforms the whole of human life. As compared with the other animals, man lives not merely in a broader reality; he lives, so to speak, in a new dimension of reality.[13]

In Cassirer's view the power of man's thought begins with the discovery that "everything has a name."[14] What he is referring to is the fact that everything man talks about is represented symbolically, that is, in terms of symbols whose distinguishing characteristic is not their explicitness of reference, but their preciseness of meaning and the versatility they allow in using that meaning. Symbols are tools of synthesis and creation because, through them, meanings initially created through an interaction with the world of experience, can be given stabiltiy and permance by means of the act of giving them a name. Later, by virtue of being treated symbolically, these meanings can be represented through the use of the same name-symbols. What we will direct our attention to now is the question of how such symbols come to be.

The symbol, in Cassirer's discussion of it, is made possible because of a sensed similarity between situations. The possibility of giving a name rests on the individual's concentration upon some property of situations, some sensed similarity between them which, by naming it, gives

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[13]Cassirer, Essay, 24.

[14]Ibid., 34-35.

rise to a symbol.[15] In Cassirer's words,

> The beginning of thought and speech is [that] . . . on our own inititive we draw certain dividing lines, effect certain separations and connection by virtue of which distinct individual configurations emerge.[16]

To recall something from Church's discussion, the child first experiences the world directly, and, as a result of such interaction, non-linguistic meanings are developed. What Cassirer is talking about in the above quoted passage might be thought of as seeing a similarity between two such non-linguistic meanings. When some similarity is perceived between two situations, thought changes through this experience from an experience of "it" to something about an "it." Yet this new meaning would be lost if it were not given permanence through the act of giving it a name. Each name-symbol thus formed is a schema, a principle for organizing similar experiences. The essence of symbolism is the use of names to designate perceived meanings created through an interaction with the world. Meaning arises through interaction, and, once the interaction is over, all that is left is the meaning, preserved if fixated through time by a name. From this it follows that the meaning named, no more than the now irretrievably past interaction, is to be found in the world.

Perhaps we can better see what is happening in terms of an example which seems compatible with Cassirer's position, and seems also to contain at least some of the essentials of his thoughts on the subject. Let us suppose then, that we are in the presence of primitive tool-using man. At the stage of language development with which we are concerned, man has learned to designate certain of his tools by name. What would be the

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[15]Cassirer, Philosophy, 283-284. [16]Ibid., 280.

meaning of the name for the tool to its user? Cassirer emphasizes the fact that, to the primitive mind, things are thought of in terms of their use, i.e., in terms of their utilitarian, functional properties. And, as Church has pointed out, to the child of today even, a car is first "something that you ride in."[17] Thus, we might suppose that if the tool were used as a hammer its name would mean something like "the thing I hit with" or "the thing I beat with," etc. Similarly, if the tool were used as a scraper, its name would mean something to the effect of "the thing that I scrape with."

Suppose now that some man loses one of his tools or that one is broken and he decides to replace it. Should he now produce a tool like the first one in its functional properties and give it the name of the old tool, we would have something of the essence of symbolism: a name that has been transferred from one concrete, particular situation to another. The name, formerly meaningful in only one situation, has been carried over and <u>applied</u> to another situation. Now suppose that the name for this tool becomes with time applied to other tools that are like it in some of its functional properties, those that have been perceived to be relevant in using its name. The name would then stand for what we are free to think of as the <u>class</u> of such tools, and its meaning would be in terms of some common functional property of those tools.

What has been suggested through the above example is that symbolic meanings develop in terms of some noted characteristic of many particular situations. Their application in any particular situation henceforth becomes a designation of some instance of some class of situations. It is

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[17]Church, 173.

the "designational" quality of the application of symbolic meaning which is referred to as asserting that symbols allow us to talk about the world.

There is an underlying assumption running throughout the discussion thus far which it might be well to make explicit. This assumption is that men have not only similar experiences of the world but that they also have similar insights concerning their experiences. In no other way could the above account claim to be an explanation of the genesis of shared meanings. That is, for the resulting symbolic meanings to be shared ones, there must have been a sameness in the sensed similarities between situations on the part of the individuals involved. The designational quality of symbols, when used, entails the assumption of referring to meanings which arose through previously shared insights.

One further point should perhaps be made, in the example given above the transfer of meanings was made in terms of use. However, it is certainly possible to see that other transfers of meaning in terms of some property of situations but not in terms of use of things are also possible. The important transfer, or maybe more correctly, the essence of the transfer is that of created meaning.

Turning now to a discussion of concepts, it can be seen that, from the very beginning, the symbol has something of the nature of a concept. Symbols designate, initially, a sensed similarity in the experiences of two or more situations while concepts group together symbolic meanings as subordinate members of a class in terms of some shared characteristic of meaning. Thus to distinguish symbols from concepts seems more a matter of degree than of kind. Looked at from another angle, concepts are expressed in symbols; we invent a new symbol to stand for a concept. Yet

there are reasons for keeping both terms and in attempting to, in some measure,differentiate between them. At the same time, we should recognize that it is only a verbal shorthand to speak of concepts rather than of symbols as concepts.

That the formation of concepts is an almost identical process to that of the formation of symbols is made clear by Cassirer in showing that the process cannot be accounted for solely in terms of abstraction.

> The process of abstraction can only be carried out with respect to such contents as have already been defined and designated, which have been classified in language and thought. But how, we must now ask, do we arrive at this classification itself? What are the conditions of that first primary formation which is effected in language and which provides the foundation for all subsequent and more complex syntheses of logical thought? . . . To penetrate to the ultimate source of the concept, our thinking . . . must seek those factors of synthesis and analysis which are at work in the process of word formation itself, and which are decisive for the ordering of all our representations according to specific linguistic classifications.[18]

In Cassirer's view, the formation of a concept begins with the apprehension of a particular common property of symbolic meanings.

> Before language can proceed to the generalizing and subsuming form of the concept, it requires another, purely qualifying type of concept formation. Here a thing is named not from the genus to which it belongs, but on the basis of some particular property which is apprehended in the total intuitive content.[19]

From the above it can be seen that a concept is not simply abstracted meaning; the concept is in none of the particular symbolic meanings from which it is supposedly taken. As Cassirer says,

> If, after having fixed and named several contents as such, we group them into the form of a series, we seem, in so doing, to have postulated a common characteristic which is manifested in all of them, yet in each one with a specific difference.[20]

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[18]Cassirer, Philosophy, 280. [19]Ibid., 283. [20]Ibid., 282.

There is in Cassirer's account an assertion to the effect that symbols make human, symbolic thought possible. We might pause now to examine that assertion more closely. It is not the trivial point that, without symbols, thought would not be "symbolic" in nature. The use of symbols provides not only the nature of human thought, but, in Cassirer's view, is essential to the fact that man is able to reflect on aspects of form and meaning as we are wont to do. Reflection requires the ability to isolate ideas, relations, or concepts for concentrated attention. For this, it is necessary that such ideas be separable from the mere stream of consciousness. This problem is characterized by Cassirer as follows:

> All consciousness appears to us in the form of a temporal process--but in the course of this process certain types of "form" tend to detach themselves. The factor of constant change and the factor of duration tend to merge.[21]

The linguistic forms (e.g., conceptual frameworks) which man creats "as products of language, myth and art, and in the intellectual symbols of science"[22] seem to have a sort of existence in the mind independently of their being referred to by consciousness at any particular moment. This is our experience of them. Yet, as Cassirer says, "At the same time in order to be manifiested, to exist 'for us,' they must be represented in this stream."[23] The problem is that linguistic formulations as products of thought must be referrable to by thought, i.e., brought into the temporal stream of consciousness--this is the character of symbolic reflection. Cassirer asserts that, "In the creation and application of the various groups and systems of symbolic signs, both conditions are fulfilled."[24] His meaning seems to be that linguistic formulations, as products of man's

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[21] Ibid., 110. [22] Ibid. [23] Ibid. [24] Ibid.

thought, have the character of being "referable to" by virtue of the fact that they were in the first place constructed in terms of symbolic meanings free in their meaningfulness from any particular external reality. They are representable in the stream of consciousness by virtue of this same fact, i.e., their meaning does not depend on anything in the stream of consciousness. The meaning of "refer to" in this case is the fact that their meaning has been previously created and can now be drawn upon. When a conceptual thought is represented in the stream of consciousness, attention is focused on these previously constructed meanings. Of course, it should be noted that this is only a description of how it seems to work in Cassirer's view, not an explanation of consciousness.

With the attainment of the ability to reflect symbolically about the world, man started on a path leading to ever greater sophistication in his conceptions of the world. It is with these symbolic meanings, or primitive concepts, which finally emerge as culturally evolved formulations of things that man's understanding of the world has been built. If our own understanding of the world is more complex and comprehensive than would seem to be provided by such a process of attained meaning as that suggested above, it is because our language has culturally evolved to higher levels of abstraction and categorization of our expreience of the world, and the power of our language in its availability to use in symbolically structuring an understanding of that experience has gained accordingly. In speaking of this increasing power of language, Cassirer says,

> The ascent to higher levels of abstraction, to more general and comprehensive names and ideas, is a difficult and laborious task . . . . Human speech evolves from a first comparatively concrete state to an abstract state . . . . In many languages we find an abundance of color names. Each individual shade of a given color has its special name . . . . The

> same holds good for the category of number: Different numerals are required for referring to different classes of objects. The ascent to universal concepts and categories, therefore, appears to be very slow in the development of human speech; but a new advance in this direction leads to a more comprehensive survey, to a better orientation and organization of our perceptual world.[25]

The power of man's thought then, lies not in his explicitness of language except in a very special sense; for the adequacy of a description to be accepted it must be explicit. Yet it seems even more important, when we are dealing with a subject of considerable complexity, that our description be given at a level of abstraction sufficiently high to allow use of comprehensive terms which include details without particular reference to any but the most prominent of them. Otherwise, we have no comprehensible description but a mass of incomprehensible details. Human meaning, symbolic meaning is not one of details, but rather one which is applied and within which details fit. This is what Church and Cassirer mean by a symbolic, and, on higher levels of abstraction, conceptual structuring of an individual's world.

The nature of the symbols man uses, their freedom from any particular external world of experience, allows man the freedom to symbolically restructure, shift and see things differently. And this, in the writer's understanding of Cassirer, is his view of what symbolic thinking is. The problem solving process found in the higher animals, and learning, apparently available to all animal life, gains freedom and power almost beyond comprehension in man alone when symbols substitute for, and allow the individual to create new, symbolically structured conceptions of the world and its possibilities.

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[25]Cassirer, Essay, 135-136.

Having reached a stage in our discussion where we are talking about conceptual creativity, attention can now be turned to the use of this capacity in creating conceptual frameworks. In discussing the case of Helen Keller, Cassirer is attacking "associationist" explanations of such things as perception and symbolic functioning. At this point, Cassirer asserts that,

> If the sensationalist theories of perception were right, if every idea were nothing but a faint copy of an original sense impression, then the condition of a blind, deaf and dumb child would indeed be desperate. For it would be deprived of the very sources of human knowledge; it would be, as it were, an exile from reality. But . . . . as the case of Helen Keller proves, man can construct his symbolic world out of the poorest and scantiest of materials.[26]

At this point Cassirer states his own position on the role of symbols in the creation of human worlds of thought:

> The thing of vital importance is not the individual bricks and stones but their general <u>function</u> as architectural form. In the realm of speech it is their general symbolic function which vivifies the material signs and "makes them speak." Without this vivifying principle the human world would indeed remain deaf and mute. With this principle, even the world of a deaf, blind and dumb child can become incomparably broader and richer than the world of the most highly developed animal.[27]

A definition of conceptual frameworks can now be given as a created "way of seeing things" that is structured in terms of symbolic meanings. It is a <u>relational</u> way of placing meanings in a certain configuration that is meaningful in and of itself. Another way of putting the point would be to say that the meanings used in such conceptual structures take their preciseness of meaning either wholly or in part

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[26] <u>Ibid</u>., 35-36.

[27] <u>Ibid</u>.

from the context in which they appear. Symbolic meanings in context form a whole which is greater than and is not simply the sum of its individual meanings.

In the next chapter we will attempt to see something of the use of conceptual structuring on the part of scientists in making a discovery. Following this a similar search will be made in one type of human problem solving--that kind which could be presumed to be aided by a knowledge of relevant concepts. We will then return to the subject of the general function of conceptually structured formulations of things in making possible what Cassirer has referred to as "the human world of space and time."

CHAPTER THREE

THE USE OF SYMBOLIC RESTRUCTURING IN SCIENTIFIC DISCOVERY

Science is thought of by many as the systematic discovering of orderliness in nature. As Cohen and Nagel point out in discussing Mill's canons of discovery, the oft-made claim that experimental methods are capable of leading to the demonstration with complete certainty of universal, invariant relations has long been regarded as resting on the assumption that nature is uniform.[1] Yet to emphasize the "lawfulness" of nature without at the same time considering the creative contribution of the scientist in discovering that lawfulness is perhaps to miss something vital to an understanding of the nature of scientific enquiry. In the following discussions of scientific discovery, Stephen Toulmin and Ernst Cassirer take pains to emphasize the conceptual creativity on the part of the scientist in discovering what lawfulness is to be found in nature. In a later discussion by David Hawkins, not only the conceptual creativity of the scientist but also the orderliness of nature is explored. Hawkins puts forward the interesting thesis that our knowledge of nature might be the result of some kind of

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[1]Morris R. Cohen and Ernest Nagel, An Introduction to Logic and Scientific Method (New York: Harcourt Brace and Co., 1934), 267ff.

interaction between our investigation of nature on the one hand, and the order in nature on the other.

Discovery in Science as New Ways of Regarding Old Phenomena

What does it mean to say that a scientist has made a "discovery" of some lawfulness in nature? Was "it" there unbeknownst to us until he stumbled across it? What does such a "discovery" amount to really? Stephen Toulmin has suggested that we should not only ask these questions, but also what "sort of demonstration will justify us in agreeing that, whereas this was not previously known, it now can be regarded as known."[2] Toulmin's point is that scientific discovery ought not to be confused with the kind of discovery that takes place when an explorer discovers a new river or a botanist discovers a new variety of flower; what the scientist actually discovers is a new way of regarding already familiar phenomena.

Toulmin goes to considerable length to present his argument as fully as possible. In the following brief synopsis covering only the main lines of the argument, no attempt is made to argue for the correctness of his views. They are presented as an at least plausible account and one fitting science as it has come within the range of the writer's experience.

Toulmin asks that we consider the possible formulation of the scientific hypothesis to the effect that light travels in straight lines, or the principle of the rectilinear propagation of light, as it

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[2]Toulmin, Philosophy of Science, 17 ff.

is known in the field of geometrical optics. As might be expected, Toulmin directs our attention first to the phenomena to be accounted for: shadows, changes in the distribution of light and shade as the sun moves or as we move a lamp, changes in the size of shadows depending (or seeming to depend) on the distance the shadow-producing object is from the lamp, and so on.

Now, as before the introduction of the idea of light traveling in straight lines, it certainly would have meant little to speak of light as traveling. As Toulmin goes to some pains to make clear, both of the key words, "light" and "traveling," in the discovery are given new uses in the very statement of that discovery. Prior to the adoption of the notion of light traveling in straight lines, the phenomena it explains remain things primitive, simply to be accepted as "the way things are." In Church's system, they are physiognomically perceived. After the discovery the phenomena become something "explained;" they are part of a symbolically structured interpretation of experience. Now they are the effects of something hitherto never referred to as "light."

The "light" now referred to is clearly not the sun or a lamp or illuminated areas; rather, it is something inferred <u>from</u> them and such phenomena as changes in shadows. This something to which we have given the label "light" is to be thought of as something that is traveling, but again the notion of traveling has been extended by the scientist in stating his discovery. In the sort of situations with which the physicist is concerned, it ought to strike us as odd to speak of anything as traveling in the usual sense of the word. The physicist

talks of light traveling whether shadows or light patches are moving or stationary. As Toulmin says,

> The discovery that light travels in straight lines was not, therefore, the discovery that, where previously nothing had been thought to be, in any ordinary sense, traveling, there turned out on closer inspection to be something traveling--namely, light: to interpret the optical statement in this way would be to misunderstand its whole point.[3]

What the physicist has done, Toulmin argues, is to take the notions, the concepts of "light" and "traveling" and use them to provide a new way of regarding familiar phenomena.

What justifies us in looking at familiar phenomena in a new way is to be determined in terms of the adequacy of, first, how well our new way of seeing things can be made to account for the facts--i.e., provides an "understanding of why they are as they are."[4] Secondly, it is to be found in new questions it prompts us to ask, questions which formerly would not have occurred to us to ask. Toulmin says:

> Coming to think about shadows and light-patches in a new way, and in consequence to ask new questions about them, questions like "Where from?," "Where to?" and "How fast?," which are intelligible only if one thinks of the phenomena in this new way.[5]

All of these questions, it should be noted, can be asked without ever troubling with the question of <u>what</u> it is that is traveling.

Finally, Toulmin cautions against thinking of scientific discoveries as simply summing up or stating more compactly a series of observations; a scientific discovery is not "a plain generalization of

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[3] <u>Ibid</u>., 20.

[4] <u>Ibid</u>., 29.

[5] <u>Ibid</u>., 21.

the observations we write down in our laboratory notebooks."[6] The discovery has the nature of inventing a conceptual formulation of things within which observations may be fitted and thereby explained.[7]

Discovery in Science as Symbolic Restructuring

The views of Toulmin find ready support in the philosophical work of Cassirer. What Toulmin has termed finding new ways of regarding old phenomena, Cassirer refers to as symbolic restructuring. Both accounts involve the creation of a conceptual framework for seeing the "facts" of the world in a new way. As Cassirer puts it,

> All systems of classification are artificial. Nature as such only contains individual and diversified phenomena. If we subsume these phenomena under class concepts and general laws we do not describe facts of nature. Every system is a work of art--a result of conscious creative activity.[8]

Cassirer, like Toulmin, points to the fallacy of regarding scientific discoveries as depending in any simple way upon accurate observations. In speaking of the emergence of chemistry from alchemy he writes,

> It was by no means the lack of empirical evidence that for many centuries obstructed the progress of chemical thought and kept chemistry within the bounds of pre-scientific concepts. If we study the history of alchemy we find that the alchemists possessed an astounding talent for observation. They amassed a great bulk of valuable facts, a raw material without which chemistry could scarcely have been developed. But the form in which this material was presented was quite inadequate. When the alchemist began to describe his observations he had no instrument at his disposal but a half-mythical language, full of obscure and ill-defined terms. He spoke in metaphors and allegories, not in scientific concepts.[9]

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[6] Ibid., 64.

[7] Ibid.

[8] Cassirer, Essay, 209.

[9] Ibid., 215.

For both Toulmin and Cassirer the process of scientific discovery calls for creativity on the part of the discovering scientist. It is not the mere apprehending of facts that leads to discover, but the casting of them into a form that is understandable. In Cassirer's words,

> For this decisive step which leads from the merely apprehendable to the understandable we are always in need of a new instrument of thought. We must refer our observations to a system of well-ordered symbols in order to make them coherent and interpretable in terms of scientific concepts.[10]

It is the creation of such "well-ordered symbols" which is symbolic restructuring; it is the result of such symbolic restructuring that is a discovery.

Discovery in Terms of Evolving Categories of Thought

It was the view of Kant that the human mind is possessed of certain categories of thought; i.e., ways of organizing the world of sense into knowledge. According to Kant the human mind imposes on received sense data the a priori categories of substance (i.e., permanent things with qualities), causality, magnitude and so on. The philosopher David Hawkins, while agreeing with much that Kant had to say, takes issue with his view that these categories are "mind-dependent and fixed, once and for all."[11] Hawkins insists that we must regard man as a being who has evolved in this world, one who has learned and is capable of continuing to learn from this world. For Hawkins, then, the categories of Kant are not fixed; they have changed and will continue to change with man's increasing knowledge of and changing views of the world.

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[10] Ibid., 217.

[11] Hawkins, The Language of Nature, 254.

The argument presented by Hawkins is a rather complex and involved one since it is given in terms of a fusion of views from thermodynamics and information theory. The results of that argument, however, are very similar to the views of Toulmin and Cassirer already presented --at least insofar as they apply to the subject of discovery in science. In Hawkins' words, "What we call science is constructed and tested out of human experience. But it is constructed, it is an artifact; its mode of construction is human, and it bears the mark of style."[12]

According to Hawkins, there is a certain necessary correspondence or relationship between man's perceiving mind and the world. With this thought, of course, we come to the view that there is order in the world, but still do not take science as the passive recording of order in the world. Hawkins greatly emphasizes the fact that the human mind is both greatly complex and highly structured and that part of the mind's function is to act as an information processing center. From one side of the question of order, the perceiving of order is a result of and made possible by a highly structured and ordering mind. However, Hawkins argues against the idea that sensory input from the world "can, in any intelligible sense, be said to receive form solely from some synthetic capacity of intuition in accordance with a priori organizing principles."[13] For one thing, there must be order in the world because "the only sensory input that is formless is sheer random noise,

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[12] Ibid., 252.

[13] Ibid.

and with such input nothing is perceived at all."[14]

The position of Hawkins might appear to conflict with the earlier formulations of Cassirer and Toulmin to the effect that the discovering of order in nature is, in Cassirer's words, "a result of conscious creative activity." However, closer inspection reveals that these positions are not at variance at all. All three writers recognize that our experience of the world is not random in character. But where Toulmin and Cassirer have emphasized the creative contribution of the scientist in formulating a conception of that order, Hawkins, for purposes of his own, is emphasizing the orderliness in nature by which the scientist is guided. Man, Hawkins asserts, is an organized perceiver who has evolved in an organized world and who makes sense of that world because his categories of thought as well as his means of perceptually receiving information from the world have an evolutionary history. But this is an argument that will be developed in what follows.

To appreciate something of the force of Hawkins' argument, we must consider what he calls a third stage in evolution. This development bears a striking similarity to what Cassirer speaks of as man's acquisition of a new, symbolic link and a new dimension of reality. However, where Cassirer is concerned with accounting for the development of a symbolic dimension of consciousness, Hawkins' main program is to find a link between this symbolic dimension and current knowledge of physiology. He finds this link in the notion of information theory.

Hawkins outlines three stages of evolution. In all three he is concerned with an informative interaction between organism and environment

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[14]Ibid., 254.

and the transfer of this information to succeeding generations of the organism. At the first stage of evolution delineated there can be only genetic transmission of any informative interaction between organism and environment, and this is small indeed in any one generation. There is no learning at this stage. The biochemical mechanisms of the responsiveness of the organism to its environment is encoded in the genetic record and passed on, but "if the species learns, it does so only by becoming a new species."[15]

Such organisms are suited to live only in simple surroundings where food is abundant, but what of the organism forced to live in a complex and variable environment? The genetic record, already tremendously complex, can only be extended so far; at some point it can no longer be extended. At some point in the distant past a learning component evolved as an addition to the organism's makeup, and this, in Hawkins' account, marks the second stage in evolution. However, the information gained by the organism's interaction with the environment is not genetically transmitted and dies with the organism. Even when some of the information needed for living is incorporated into the environment, as in bee hives, this limitation remains unremoved.

In the ancestory of man, however, Hawkins asserts that this upper bound has ceased to be effective. "The third stage of evolution is marked, within a single genus, by the appearance of a new <u>mode</u> of evolution, non-biological and more rapid by orders of magnitude than the biological mode."[16] This new mode of evolution, linguistically

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[15] <u>Ibid</u>., 271. [16] <u>Ibid</u>., 276.

mediated, cultural evolution, is manifested both externally and internally.[17] Man not only lives in his environment, he remakes it and controls it. He is able to do this because he has a linguistically mediated understanding of both himself and of his place in the world as well as of the world itself. The internal side of cultural advance is the creation and sophistication of a human world of symbolically structured experience. Hence, we find in Hawkins' account the thesis of Cassirer; namely, that the individual's comprehension of the world and the people about him, and of himself, is a linguistic process of symbolic structuring.

We are now ready to return to our discussion of the process of scientific discover, for, in Hawkins' view, one of the things evolved and culturally transmitted through culture is the world view of that culture; within it and basic to it are its categories of thought. The categories of thought are a cultural achievement evolved out of a refinement of analogies. The refinement of analogies might be compared to a refinement of tools. As Hawkins at one point says:

> There is a continuity in the development of knowledge, just as the tools we make are limited by the tools we already have, the tools to make them with. In neither case can we make arbitrary innovations, and in neither case are limited to a mere replication of what we already have.[18]

At this point we can see a very close correspondence between the thoughts of Hawkins and Cassirer if we view analogies as symbolic structures and

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[17]Hawkins' terms for the above aspects of cultural evolution are the "externalization" and "internalization" of culture.

[18]Hawkins, 245.

the refinement of analogies as symbolic restructuring.

Hawkins stresses the fact that the categories, as ways of organizing experience, have a long history, a cultural, evolutionary history, and that, as such, they reflect the cumulative effects of the interaction between man's culture and the world. There is a necessary correspondence between man's ways of regarding the world and the world itself--although not a necessary knowledge of the world. Man's analogies are couched in a sort of "language of nature." By this Hawkins means that we have "these categories of knowledge and not others because these facilitate flows of information as others would not; we evolve the channels to fit the signal source, of nature."[19]

At the risk of oversimplifying things, it would seem that what Hawkins is saying could be boiled down to a conception of the scientist as limited by the conceptual tools he brings to an investigation of nature, on the one hand, and the "facts" of nature on the other. Hawkins' regard of this state of affairs is an optimistic one because the former limitation is subject to cultural development and sophistication. In Hawkins' view then, the process of scientific discovery is one involving the refinement of analogies whose use results in statements which more and more closely approximate true statements about the world

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[19] Ibid., 254.

CHAPTER FOUR

A FURTHER CONSIDERATION OF HUMAN UNDERSTANDING IN TERMS OF SYMBOLIC RESTRUCTURING

It will be recalled that Cassirer puts forward the thesis that man has gained the ability to think about the world and apply conceptual frameworks to the world through the development of an abstract symbol system, i.e., language. There must be an intermediary stage in which there occurs the symbolization of experience before human, symbolic thought can take place. Yet, once this symbolization of experience is underway, the meaning of terms man uses does not depend on concrete sense data, i.e., the "sensible" world need not be present to be referred to. Man is free in his thought processes from any concrete, particular external reality. Symbolic meaning is a created structure of man's mind transmitted through language, and it is entirely in terms of such meanings that the understanding of the world which is uniquely man's is structured.[1]

Cassirer's contention is that what distinguishes human thought is that man has developed and has exclusively available to use by his consciousness a symbolic environment, with it an ability to think symboli-

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[1]Cassirer's emphasis upon the symbolic nature of man's thought might seem excessive unless it is remembered that his treatment of the subject is one that excludes physiognomic percetion as part of man's view of the world. In other words, Cassirer is concerned with contemplative, judgmental and analytic thought which, as was noted in Church's discussion, indicates the cessation of physiognomic perception.

cally about the world, and finally to conceptualize the world symbolically and thus understand it. We are therefore free, within the framework of Cassirer's account, to differentiate between a symbolically conceptualized understanding of the world which is man's alone and other, non-symbolically structured understandings--attainable by at least the higher animals. In this chapter we shall be looking for those features of our own, uniquely human understanding distinctive from the rest of the animal world.

We might begin by postulating a structured awareness of the world in all of animal life, in the higher animals, a consciousness which is the result of mental activity. In man, through his use of the symbol, this activity has become something more. Beginning with the assumption of an active consciousness in man, we might turn to questions concerning the possible activities of the mind. How is it active? What does it "do"?

For one thing, we now can be fairly certain that it does more than simply combine elements by "association." In discussing the possible combining of elements of consciousness, Cassirer points out that the concept of association is "broad enough to cover all relations that could possibly exist in consciousness; but by its very breadth it obscures their specific character."[2] As he goes on to say,

> Association fails to distinguish between relations of the most diverse quality and modality. "Association" means the fusion of elements into the unity of the ego or the object, into the whole of a thing or a sequence of events--into a series whose members are connected by the criterion of cause and effect and into a series whose members are connected by the criterion of "means" and "ends."[3]

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[2]Cassirer, Philosophy, 102. [3]Ibid.

Cassirer's point is that by failing to take into account the system of functions which consciousness achieves, "the diversity of paths by which consciousness arrives at its synthesis is totally obscurred."[4] At the same time it gives the character of consciousness as that of a passive perceiver of the world. In his view the mind is constantly engaged in the structuring of information sensorially received from the environment and in seeking more information from that environment. In Church's system, the above activity is what he refers to as schematization.

In Cassirer's discussion of relational thought, he begins by making the point that the awareness of relations is not restricted to humans; animals have been trained in choice situations and show a great ability in choosing among objects on the basis of the correct choice being nearer than, darker than, larger than, and so forth. The difference between animals and men in problem solving, he states, is that the animal is tied to particular situations wherein he can solve the problem in terms of things present; man, however, is not so limited to things concrete and present.[5]

His examination of the evidence leads Cassirer to assert that "higher animals are capable of that process which Hume in his theory of knowledge terms making a 'distinction of reason.'" Yet he goes on to say:

> But all the experimenters engaged in these investigations have also emphasized the rarity, the rudimentariness and the imperfection of these processes . . . . If there are certain traces of a distintio rationis in the animal world, they are, as it were, nipped in the bud. They cannot develop because they do not possess that invaluable and indeed indispensable aid of human speech, of a system of symbols.[6]

Man shares with the higher animals then, his creative, active consciousiousness, but, through a greater capacity or something we might loosely

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[4]Ibid., 103. [5]Cassirer, Essay, 38-39. [6]Ibid.

term intelligence, he has gained the use of a tool of thought beyond the reach of the rest of the animal world. The symbol, as Cassirer has asserted is the key to the understanding of man, for it is the use of the symbol that has freed man's consciousness from things experienced directly. The relational thought of man requires a complex system of symbols wherein relations can be structured and considered in themselves.

> We do find in man a special type of relational thought which has no parallel in the animal world. In man an ability to isolate relations--to consider them in their abstract meaning has developed. In order to grasp this meaning man is no longer dependent on concrete sense data, upon visual, tactile, kinesthetic data. He considers these relations "in themselves."[7]

From Cassirer's account, it would appear that the distinctive features of human thought and understanding that we seek are to be found in the fact that man possesses the tool of conceptual thought which allows him to consider a problem in its abstract relational aspects. In Church's system, the schema is made explicit through being treated symbolically. Or, to refer back to the previous discussion of scientific discovery, it can be seen that reaching such a discovery involves something more than can be accounted for in terms of perceptual acuity--i.e., in terms of astute observation of the facts as presented visually. The scientist's solution involves the structuring of phenomena into a new form, a working conceptualization which can then be applied back to the observational "facts" to see whether they are accounted for or not in terms of this new formulation of things. The power of man's thought depends upon the power of the conceptual tools he can bring to the task and these in turn are dependent on cultural advance in sophisticating language

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[7] Ibid.

and individual, human ingenuity in using that language.

Symbolic Versus Perceptual Problem Solving

Some of the contentions that have been raised thus far in the present discussion of human understanding will be both clarified and supported through a discussion of human, conceptual problem solving. However, to provide some needed contrasts between animal and human problem solving, some discussion of the problem solving efforts of animals will also be included. Comprehension of the presently advocated view of human understanding almost necessitates distinguishing it from animal understanding. To that end the efforts of the present section are bent.

Kohler's studies of insightful problem solving in chimpanzees provide excellent material for the discussion of animal problem solving. When properly considered we can see in them some of the points of Cassirer's just recounted discussion of relational thought. In Kohler's studies, it is possible to see the seeking of new relationships within the visual field as the source of insight.

In his discussion of insightful solutions Kohler seems to imply, that, when confronted with a problem solvable through a rearrangement of objects, prior to such actual rearranging there occurred a perceptual restructuring of the situation. In the single box problem, for example, a lure was hung out of reach with a box present but not under the lure. All of the animals tested made repeated attempts to reach the lure by jumping, even jumping from the box in its unmoved position. However, Sultan, whom Kohler came to regard as most intelligent of the group, soon ceased jumping, paced up and down, and suddenly stood in front of the box. Then, moving it quickly beneath the lure, he mounted it, jumped, and secured

the lure.[8] The contention the writer wishes to assert here is that before moving the box beneath the lure, i.e., prior to actually rearranging the physical environment, Sultan shifted his regard of his perceptual field. He "saw" the box beneath the lure and what such a positioning of it would result in with regard to his attempts to reach the lure. This perceptual restructuring (or what Kohler and others have termed a "Gestalt"), the writer is arguing, was his insight. Yet we should not stop here but go on to notice that his insight was one that penetrated the nature of the problem he faced and was a solution of the problem. Dare we dignify his regard of the unmoved box, his, as has been argued, "seeing" it beneath the lure with the term "hypothesis"? Possibly we can, for we have in Sultan's insightful solution of the box problem all of the elements of scientific discovery save one, symbolic restructuring or manipulation in terms of relevant concepts. The necessary tie-in with the previous discussion of scientific discovery lies in the fact that his insight amounted to an understanding of the problem situation. It was a general, rudimentary type of understanding, and a non-symbolic one to be sure, but an understanding nevertheless.[9]

Having in some measure accounted for an animal's understanding of a problem situation in terms of non-symbolic relational thought or perceptual restructuring, let us turn to some analogous studies in human

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[8]W. Kohler, "The Mentality of Apes," following Woodworth and Schlosberg's discussion in "Problem Solving and Thinking," Experimental Psychology (New York: Henry Holt and Co., 1954), 820.

[9]It might be argued that there is no reason to insist that Sultan's understanding was a non-symbolic one. However, the point is that conceptual thinking need not be invoked to explain his insightful behavior. As the following discussion endeavors to show, this is not the case with regard to human understanding.

problem solving. Because investigators have long been aware of the importance of concepts to the processes of human problem solving, problems have been devised whose solutions entail the use of some widely held concept. In Maier's two-string problem, for example, the needed concept is that of the pendulum.[10] The subject is introduced into a room, bare except for two strings hanging from the ceiling, a chair, a piece of wire, and a pair of pliers. The solution involving the use of the concept of the pendulum is for the subject to tie the pliers to one of the strings and set it swinging--i.e., make a pendulum out of it, then, holding the other string, grasp the swinging pendulum at its nearest point. The problem is made more difficult by the fact that a wire is present and pliers are generally regarded as a tool used on wire. The concept "tool," reinforced by the wire, is in the way of the concept "weight" which in turn can only be seen as relevant in terms of the concept "pendulum." A conceptual solution requires that, in accordance with the concept "pendulum," the concept "tool" be replaced by the concept "weight." When the problem is solved as above, then we have what we can truly identify as a symbolic restructuring of the situation into one in which one of the strings is seen as a potential pendulum and the pliers are seen, not as a tool, but as a weight for it.

Now let us return to our discussion of the distinction between perceptual restructuring and symbolic restructuring. Sultan's solution to the box problem required a restructuring of the perceptual field. The

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[10]N.R.F. Maier, "Reasoning in Humans, II," following C.E. Osgood's discussion in "Problem Solving and Insight," Method and Theory of Experimental Psychology (New York: Oxford University Press, 1953), 632-633.

human, symbolic solution to Maier's two-string problem, however, requires not only a restructuring of the perceptual field, but its restructuring in terms of a known concept previously not seen as relevant to the situation. To use Toulmin's formulation, the "notion" of the pendulum must be applied to this particular situation. Again, the elements of an attained understanding are before us, but new, uniquely human elements have been added: the combination of perceptual and symbolic elements (i.e., concepts) into a new kind of understanding, a symbolically structured, conceptual way of relating the elements of the problem.

Still let us pause to consider that the above argument for a symbolic restructuring is in some ways open to attack. A solution could have been reached without any symbolic restructuring. The subjects could have seen that what was needed was a weighted, swinging string and also seen the pliers as a means of achieving this without ever even possessing the concept of the pendulum. Their solutions would then have been like Sultan's solution to the box problem in every respect. As John B. Carroll has pointed out, human beings do solve problems without having knowledge of how a physicist would describe their behavior in terms of scientific concepts:

> The concept of the lever is utilized by the farmer when he pries up a stone, even though he may not verbalize it with either the words lever or pry. In such cases it might be thought that we could dispense with the notion of concept and assert that the response of the farmer is a direct learned response to a particular kind of problem, namely a stone which is hard to move. Nevertheless the fact that the farmer may exhibit considerable planful behavior--going to get a crowbar, digging a socket for it, and finally moving it in a certain direction--suggests that there is more than a direct, overt response to the problem situation. On the other hand, the farmer might be hard pressed if someone asked him to

> explain how even a not-very-strong child can move, with a crowbar, a stone much heavier than himself.[11]

As Carroll notes, to dispense with the notion of concepts, it is necessary to account for the farmer's "planful behavior." In this connection, it should be considered that the farmer's behavior seems completely analogous to the behavior of Kohler's chimpanzees after they had mastered a particular method of solution. Having learned to use sticks, they would look for a stick in solving a problem. Neither the farmer's nor the chimpanzee's behavior is a direct response to the problem situation, but a learned response to a particular kind of problem. The main difference is in the farmer's greater intelligence, which results in his "knowing" that a crowbar is appropriate to the solution to this type of problem, while the chimpanzees, having learned to use sticks, would try to use them even in a situation in which their use would be wholly inappropriate.

The point to be emphasized here is that while human beings can and often do solve problems in terms of what we have termed a perceptually structured understanding, a symbolic solution to a problem is not of this nature. To put the point more strongly, to have a concept requires being able to characterize it symbolically. This use of concepts, and the understanding it makes possible, is limited to the human species. Viewed in this way, it can be seen that the farmer who uses a crowbar as a lever no more has the concept "lever" than Sultan, in putting two sticks together to reach a lure has the concept "extension." Such non-symbolic problem solving behavior seems adequately accounted for in terms of perceptual structuring and learning without ever invoking concepts. "Concepts," as

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[11] J.B. Carroll, Language and Thought (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1964), 84-85.

they are treated here, then, are symbolic concepts. It is only in so far as man has achieved a symbolic conception of problem situations and a symbolically structured, conceptual way of relating the elements of problems that he has succeeded in advancing away from the type of thinking engaged in by the apes. For adequate illustration of this latter point however, we might turn to a more typically human problem, one presented in verbal terms and solved in symbolic concepts.

A classic experiment by K. Duncker provides a good example in this instance. Students were given difficult, technical problems and requested to think aloud as they solved them. They were to express even the foolish notions that occurred to them, and they could ask any questions they wished. In one such problem the subjects were given the problem of ridding a patient of an inoperable stomach tumor without damaging any tissue except that of the tumor. They were further informed that rays were available which destroyed organic tissue at sufficient intensity. One subject's sequence of proposals ran as follows:

> (1) Send rays through the esophagus. (2) Desensitize the healthy tissue by means of a chemical injection. (Experimenter: False analogy; no injection is in question.) (3) Expose the tumor by operating. (4) One ought to decrease the intensity of the rays on their way; for example--would this work: turn the rays on at full strength only after the tumor has been reached. (5) One should swallow something inorganic (which would not allow passage of rays) to protect the healthy stomach-walls. (Experimenter: It is not merely the stomach-walls which are to be protected.) (6) Either the rays must enter the body or the tumor must come out. Perhaps one could alter the location of the tumor--but how? Through pressure? no . . . (9) Move the tumor toward the exterior. (The experimenter repeats the problem and emphasizes, "which destroys at sufficient intensity.") (10) The intensity ought to be variable. (Compare 4.) (11) Adaptation of the healthy tissues by previous weak application of the rays. (Experimenter: How could one decrease the intensity of the rays en route?) (13) Reply: Somehow divert . . . diffuse rays . . . disperse . . . stop! Send a broad and weak bundle of rays

> through a lens in such a way that the tumor lies at the focal point and thus receives intensive radiation. (Total duration about half an hour.)[12]

In the above example what was an hypothesis becomes a solution because it not only reaches the goal (in this case the elimination of the tumor), but is seen to be a consistent path from what is given to what is required. In Duncker's experiment the crucial concept was convergence. However, this concept could only be seen as relevant after the subject had fully considered the concept of the ray with its capacities of doing limited damage depending on the strength of its application. Then ways were open for examination of means of concentrating the strength of the ray at the point of the tumor and no other, and thence to the utilization of the concept of convergence.

The distinction sought between understandings as perceptually structured insights and symbolically structured ones should now be clear. In the former, as Cassirer has argued, there occurs the perceptual restructuring of elements in terms of things present--possibly benefitting from past learning. In the latter there is a reformulation of the problem into a system of well-ordered concepts that provides a "way of seeing" these elements in a way which meets the requirements of a problem in terms of its givens. Such conceptual structures or frameworks are the individual's solution to the problem, but it is his use of such formulations in seeing the elements of the problem in the needed way which is his understanding. An important point to be emphasized here is that these latter, uniquely human understandings are communicable. Man's symbolic tools, to use

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[12]K. Duncker, "On Problem-Solving," following C. Osgood's discussion in . . . Experimental Psychology, 626-627.

Hawkins' phraseology, are truly "tools to make tools"; with them there is theoretically no limit to the conceptual power man's thought is capable of reaching. This is because with symbolic thought there has been a concomitant creation, the ability to communicate abstract thoughts. Cultural advance stems from the creative genius of individuals who build in their turn upon the creative genius of the individuals who have preceded them. The communicative nature of symbolic thought lies in the fact that, to say something is not necessarily to "know it," but to "know something" symbolically requires being able to say it. Or, to put the same point in terms of the issues as presented by Carroll, the farmer who uses a crowbar as a lever does not have the concept "lever" unless he is able to discuss his behavior in terms of fulcrums, equal moments, etc. or some symbolic equivalents thereof.

At this point and before continuing, it might be well to briefly recapitulate what has been covered thus far. Through a discussion of the process of discovery in science and the processes of one type of human problem solving, we have pursued the notion that the attained understandings in the two cases, i.e., scientific and ordinary human understandings, are of essentially the same nature, a "way of seeing things." While striving to express their similarities, however, attention must also be given to differences in the ways such understandings are held (i.e., used) in the two cases. As was noted earlier, there is a great deal of difference in the "level of reality" attributed to what amounts to working formulations by scientists on the one hand and people in their everyday lives on the other. We have already seen in the discussion of scientific discovery that the scientist is very sophisticated in his understanding of

possible relations between his theories and observational facts. Part of the following sections of this chapter will be devoted to making the above point clearer.

The Relation Between Theory and Fact for the Scientist

To think about the world theoretically is almost by definition not to confront it directly. A theoretical approach is just that, a symbolically mediated approach to the world, and, in terms of that approach the world is treated "as if" it conformed to our theoretical formulations of it. We might say that the role of theories in science is that of a working conceptual framework which allows us to orient ourselves within the activity of investigating nature. An example provided by Toulmin is useful here. For some purposes it is useful to the scientist to think of a cylinder of hydrogen gas "as if" it were a box of fast-moving billiard balls. We are quite right in supposing that the scientist does not really think that a cylinder of gas *is* a box of fast-moving billiard balls; he does not. It is the relevant properties of the analogy that give its usage a functional utility. That is, for purposes of treating the subject he has found it useful to think of the cylinder of gas in this fashion.[13]

Another example of the way the scientist's notions are related to fact is provided by the concept of absolute zero, also discussed by Toulmin. As he points out, the presence of an absolute zero of temperature might at first appear as a "strange and ineluctable fact about the universe;" the point beyond which it is impossible to go.[14] However, as

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[13]Toulmin, *The Philosophy of Science*, 165-167. [14]*Ibid.*, 129-133.

he later makes clear,

> The existence, at some point, of an absolute zero of temperature is not a brute fact at all, but a conceptual matter--i.e., a consequence of the way we give meaning to the notion of temperature, and put degrees of warmth and cold into relation with the number series.[15]

The notion of absolute zero is found to be a logical consequence of the introduction of the concept of an ideal gas, and with it, an aligning of numbers in an ideal gas scale of temperature such that numbers below -273.16° C have no interpretation as temperatures.[16] The current technological fact that no temperatures lower than the physicist's "absolute zero" have been reached might be taken as confirming evidence for the efficacy of his way of looking at things. However, the physicist suffers from no delusions that his concept represents a "brute fact" of nature. It is probably true that the present line of reasoning could be carried too far. Certainly it is true that if the scientist did not in fact attribute a great deal of meaningfulness and significance to his theoretical formulations he would quite reasonably feel he was wasting his time. The confirming evidence of his predictions, for one thing, give him cause to think that he is making statements, however indirect, about the world of fact. The point being made is that he does realize that his statements are indirect, that he is treating the world in an "as if" fashion. He is aware that he is not simply talking about "the way things are." And on this note let us turn to what correspondes to the scientist's body of theories, the person's everyday understanding of things and events, or, more generally, simply one's beliefs.

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[15] Ibid. [16] Ibid.

Everyday Understanding

As Kenneth Boulding sets forth the nature of everyday understanding,[17] it has the character of a psychological system. It is a composite of many conceptually structured understandings as they have been discussed thus far--though much of it has not been given explicit symbolic formulation. That is, the kind of understanding previously discussed should be thought of as a portion of an individual's total understanding which has been given explicit symbolic expression. To use Church's terms, conceptually structured understandings are symbolically formulated portions of larger schematic frameworks.

Boulding further elaborates his conception of a person's total understanding as an orientation to the world as experienced in terms of space and time, a system of inter-personal roles, and a knowledge of "how things operate."[18] Finally, Boulding stresses the fact that everything in a person's total understanding is, in varying degrees, valuatively assessed.

Boulding begins:

> As I sit at my desk, I know where I am. I see before me a window; beyond that some trees; beyond that the red roofs of the campus of Stanford University; beyond them the trees and roof tops which make up the town of Palo Alto.[19]

He goes on to develop his spatial understanding of things as containing a conception of the location of the state of California with relation to the rest of the United States, of the United States, in turn, with rela-

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[17] Boulding, The Image. Boulding's term for what in these pages is referred to as the person's "total understanding" is "the image."

[18] Ibid., 5. [19] Ibid., 4.

tion to the rest of the world. The world is visualized as a globe, which, within another formulation of things, is seen as a tiny speck "circling around a bright star which is the sun, in company with many other similar specks, the planets."[20]

He continues,

> I know that I came to California about a year ago, and I am leaving it in about three weeks. I know that I have lived in a number of different places at different times. I know that about ten years ago a great war came to an end, that about forty years ago another great war came to an end. Certain dates are meaningful: 1776, 1620, 1066. I have a picture in my mind of the formation of the earth, of the long history of geological time, of the brief history of man. The great civilizations pass before my mental screen. Many of the images are vague, but Greece follows Crete, Rome follows Assyria.[21]

We have traced Boulding's conception of his own understanding far enough to gain support for our composite characterization of it. His spatial understanding is something composed of many sub-understandings. In turn, his spatial understanding is but a part of his total understanding, his total conception of his "place" in the world.

This composite nature of each of the sub-understandings is perhaps most clearly illustrated in Boulding's description of his "place" in time. Some of the parts of his conception of time have their sources in personal experience, but the bulk is a culturally transmitted heritage. The dates 1776, 1620 and 1066 probably gained their meaningfulness through courses in American and British history. The conceptions of the "long history of geological time" and the "brief history of man" could have come from a course in physical anthropology, while the sequence of Greece following Crete, etc., could have come from the study of ancient history.

To continue with Boulding's description of the adult's world view,

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[20] Ibid. [21] Ibid.

we might note his first two major propositions: a) that behavior depends on individual understanding, and b) that "the meaning of a message is the change which it produces" in an individual's understanding of himself, things, and events.[22] The first conforms to the social psychologist's notion that what a man does depends upon how he defines the situation he is in. The second conformsto the present use of meaning to the effect that the meaning of a communicated message is the change which it produces in the psychological system of the receiver.

As Boulding sets forth the nature of man's interaction with the world, there are five things which may happen when a message is received. It may go right through, i.e., it may be ignored; it may change a person's conceptions in some well-defined way, as, for example, the occurance of an expected event; it may cause a reorganization of the person's understanding (Boulding's example for this is religious conversion); it may cause an effect of adding to or clarifying some part of his understanding; and finally, it may cause doubt or uncertainty to be introduced into his understanding.

All of these possible effects of messages are of interest and all are, in varying degrees, in conformity with the presently advocated view of communication as resulting in a reorganization of a person's psychological system of understandings. However, the third and forth effects (i.e., reorganizing understanding and adding to or clarifying understanding) are of particular interest with regard to the present interest in communication, for these are particularly amenable to interpretation in terms of the transfer of understandings via the communication of conceptual

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[22] Ibid., 6.

frameworks. Boulding's views on the effects of messages is something that will be returned to and used in a later attempt to fit some of the notions explored in this and the previous chapters together into a composite view of the communication process. Before doing that, however, there are a few more ideas that will be needed and that are contained in Church's treatment of the adult's world view.

The Symbolic Processing of Schemata

In this section we will return to Church's discussion of schematized experience, at this time concentrating upon his discussion of the individual's process of treating these schematized notions of the world symbolically.[23] Church's conception of this process is the recasting of schematized experience into verbal structures that are symbolically understandable.[24]

We have noted earlier that the child first schematizes space pragmatically in terms of direct experience. What is happening can be thought of as a process wherein the objects of perception experienced directly are sorted out and fitted into a perceptually meaningful field of action. The resulting field of action is a schema. When this schema is symbolically processed there is the creation of a symbolic space, i.e., space is no longer confronted directly but is treated in terms of symbolically conceptualized notions of space.

A thought from Cassirer is helpful in distinguishing between space experienced as a field of action and symbolic, conceptualized space. He

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[23]Church's term for the symbolic treatment of previously schematized experience is "thematization."

[24]Church, 97.

uses the example of the savage who might know every crook and turn of a river, every rock and shoal and rapid. Yet, if asked to give a symbolic representation of his knowledge, i.e., a map, he would be completely at a loss. It is not that he is not in possession of all of the facts necessary to the completion of an accurate map; he simply never has represented these facts to himself or to anyone else except as a succession of direct experiences. He could sit and tell successively every turn to be expected in navigating the river so that someone listening to him, who did represent his space symbolically, could draw a fairly accurate map from his successive description, but for him it would remain a sequence of direct experiences.[25]

Returning to Church's exposition, the five-year-old has a very accurate conception of how the house he lives in is constructed, but the picture he would draw of it would reflect, not how the house is actually constructed nearly so much as the way he has experienced it.[26] With the acquisition of language and the mastery of this mode of expression, there comes the concomitant ability to give a symbolic representation of perceptually experienced space--in accordance with symbolically learned rules of representation.

In chruch's discussion of the symbolic processing of experience, there is also an element of what Cassirer (and to some extent Hawkins) has referred to as the development of a symbolic dimension of reality.

> In our society, the children of symbol-minded parents quickly pick up styles of analytical, logical, playful, critical language and begin the slow and painful but rewarding venture of working and reworking their experience symbolically until they

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[25]Cassirer, Essay, 44-46. [26]Church, 8.

> have achieved rational thought. In so doing, the individual carries a step further the evolutionary internalization of the environment: he internalizes it symbolically and can carry his experience around with him.[27]

Church sounds a note very remindful of Cassirer when he writes,

> In verbalizing reality, we make explicit the properties of and the connections between things, properties and connections which were only dynamistically implicit or wholly hidden. Once language has called our attention . . . to previously latent features of the landscape, they remain permanently accessible to us.[28]

The discussion by Church of the individual's symbolic treatment of his implicitly understood, schematically ordered experience into symbolically represented, conceptually structured knowledge that is permanently accessible to consciousness concludes our discussion of <u>what</u> is communicated. In the following chapter, attention will be turned to a discussion of some notions on the subject of <u>how</u> it might be communicated.

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[27] <u>Ibid</u>., 107. [28] <u>Ibid</u>., 107-108.

CHAPTER FIVE

THE COMMUNICATION OF CONCEPTUALLY STRUCTURED UNDERSTANDINGS

It is the purpose of this last chapter to return to and in some ways expand upon the conception of communication put forward in the introduction. Thus advantage can be taken of insights gained through the preceding discussions of the nature of conceptually structured understandings. It should perhaps be noted before beginning this last discussion that no pretense is made of answering all of the questions or even of considering all of the problems raised by such an inquiry as has been undertaken in these pages. Full consideration of <u>how</u> understandings as we have discussed them are communicated would most properly be subject of another study, perhaps even greater in length than the present one. In short then, what follows are some thoughts about the process of communicating a system of ordered symbolic concepts.

To begin with it might be well to emphasize again a distinction between understandings and conceptual frameworks made in the introduction. "Understanding" should not be regarded as synonymous with "conceptual framework" but rather as the use of same. Thus the message content embodies a conceptual framework which the receiver, in comprehending its structure and the symbolic meaning contents within it, gains the use of on his own behalf. The present consideration of the process of communicating conceptual understandings then, places special emphasis on the

activities of the receiver in inferring the other person's understanding. He does this by comprehending the conceptual framework embodied in the messages he receives.[1]

The process as thus far described conforms to a view of communication advanced by Boulding. His view of communication is the inferring of the understandings of the world "which are possessed by those around us from the messages they transmit to us."[2] Unfortunately Boulding does not elaborate upon this conception. However, taken together with his discussion of the possible effects of messages, it is still capable of being expounded more fully. One such effect that was singled out earlier for later discussion at this time was that of adding to, clarifying, and thus causing a reorganization of understanding. The view that communication can result in a reorganization of a structured understanding conforms quite well with the view of the process indicated above. What needs to be added to make it conform completely is to say that it is the utilization of a conceptual framework which reorganizes understanding. In both cases it is possible to say that to the extent that the receiver's conceptions of the world are restructured, or are capable of being restructured, by virtue of having correctly inferred the understanding of things held by the transmitter, then, to that extent communication has taken place.

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[1]Of course this process is aided by the simultaneous communication of meanings via gestures, inflection, tone, etc., but this aspect of the process is a subject that has received considerable attention elsewhere and will not be gone into here.

[2]Boulding, 17.

To continue, it might be noted that our discussions of the nature of understandings has provided some views on the question of how messages come to be formulated. Here the reader is referred to two previous discussions: first to the discussion of problem solving leading up to the assertion that to understand something symbolically requires being able to symbolically express it, and second to the discussion of the symbolic processing of schematized experience by Church. The point of these discussions might be summed up as follows: the very act of symbolically understanding something entails the formulation of a conceptual framework which symbolically expresses it.

The above conception of the role which the nature of understandings plays in the formation of messages is given explicit expression by Church. According to Church, when one person speaks, he verbalizes a portion of schematic framework. His verbalizations should therefore be regarded as both a formulation of his thoughts and as the transmitted message. A listener, on the other hand, "puts on" the schema of the speaker, and, in efforts to express its lack of congruence with his own, puts forward his own verbal formulations with regard to the subject. One person begins to verbalize his attitudes and the other chimes in with his own elaborations, corrections, objections, or alternative symbolic formulations of the subject.[3]

A further aspect of communication, as Church discusses it, arises through the fact that symbolically formulated schemata are only portions of larger schematic formulations, not all of which have been made explicit through being treated symbolically. If the subject is one not previously

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[3]Church, 129-131.

thought out by the speaker, large parts of it may be only implicitly schematized at the start of the conversation. In the course of formulating his thoughts what was only implicit becomes explicit. If the subject is a familiar one,of course, then his verbalizations are actually those of an already symbolically structured schema and his speech flows out as a fluent expression of a well-thought-out position.[4]

Whether communication has occurred, of course, depends only in part upon the fact than an understanding has been given verbal expression. As noted before, only in so far as the process results in possibilities for a restructured understanding on the part of the receiver can we say that communication has taken place. Church's treatment of the subject provides some further thoughts on how messages might come to be formulated and expressed. However, with regard to the problem of how they might be inferred, there is nothing more in his account than a statement that, in some manner, the listener "puts on" the schema of the speaker.

In considering the possible nature of this inferring process on the part of the receiver, it might be well to look for clues as to how it proceeds in the discussion of symbolic understandings. It is possible that the very thing that makes them capable of being given symbolic expression also provides the means by which they are inferred, namely the fact that they consist in the use of conceptual frameworks. Viewed in this way, the problem seems to amount to answering the following question: what is there about linguistically expressed conceptual frameworks that renders them capable of being comprehended--i.e., incorporated into an understanding?

One answer to the above question might be that an expressed

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[4] Ibid.

conceptual framework is very readily and naturally apprehended, by virtue of the fact that it is structured in accordance with the same rules by which human thought is structured. This answer is supported by a widely held conception of human, symbolic thought in the social sciences, that it is the exact counterpart of normal human speech.

To say that the structure of conceptual frameworks, as they have been previously discussed, conforms to the rules of grammatical expression in no way conflicts with anything that was said conderning their structure. Before it was discussed as a relational "way of seeing things" in a meaningful configuration. Now the fact is simply added that, in achieving coherent expression, these configurations must be structured in accordance with the rules of grammar. The vast topic of the restrictions imposed on conceptual thought by our grammar, with its sharp distinctions between things (named by nouns), their properties (adjectives), etc., cannot be discussed here. Grammer is too large a subject to discuss either the restrictions it imposes or the extent to which these restrictions are removed or altered by languages constructed for that purpose, e.g., symbolic logic and mathematical languages. Emphasis here is rather on the positive, structural function which grammar plays in thought and speech.

To return to the discussion of what is involved in the receiver's process of inferring someone's understanding, the above considerations would seem to lend themselves to support a case for its being accomplished in the following manner. In symbolically formulating his thoughts, a speaker is actually doing not one but two things. He is expressing symbolic meaning contents and at the same time exhibiting grammatically and syntactically how they fit together.

To speak of "exhibited structure" in human discourse might strike one as a bit odd. Yet it amounts to little more than saying that a meaningful configuration of concepts is as meaningful when given ordered expression by someone else as when it is formulated in one's own thought--with one difference. Thought is generally without commitment and conforms with one's value structure. Understanding the verbal output of someone else very often is lacking in one or both of these qualities. But this possible source of resistance to understanding is at least not directly related to comprehending the meaning of the terms used. Such valuative, persuasive aspects of the problem go beyond present interests and need not concern us here. For present purposes it is enough to say that there is a perceivable structure as well as symbolic meaning contents in the use of language. It might be possible to conceive of such perceivable structure as "instructions" to a receiver as to how one's thought is ordered. Or, eliminating the impression of intentional behavior on the part of a speaker, we might say that part of a person's verbalizations could be <u>logically</u> <u>construed</u> as "instructions" to structure the symbolic meaning contents he is sending in a particular fashion.

The receiver's inferring processes might be compared to the processes involved in a problem solving situation of the type discussed before. In both cases a person is faced with the task of obtaining the use of a conceptual framework and with it an attained understanding. Still it must be noticed that in the case of a receiver his attained understanding could differ from that of the person he is trying to understand. But by gaining the use of the particular conceptual framework communicated, and with it gestural cues, he is able to infer the other's understanding.

Perhaps now the reason for making the distinction between understandings and conceptual frameworks has become clear. Although both are to be thought of as mediating constructs, i.e., as "in" people, in the present formulation the former is inferred from the latter. Only the latter is a vehicle of communication. In the same way it was insisted that symbolic meanings are not to be found in the world (i.e., they too are mediating constructs). Yet the symbol proper is capable of being expressed even though its meaning is not. Thus it can serve as a vehicle of communication in a fashion completely analogous to that given as the function of conceptual frameworks. In both cases their expression in messages serve to arouse meaningful responses in receiver's.[5]

Of course the problem solving analogy has some limitations, and it might help clarify the present view of communication to point them out. For one thing, in a problem solving situation, a person is attempting to formulate a conceptual structure. In a communication situation of the type under discussion, he is attempting to perceive a presented conceptual structure. Moreover, the processes of the latter situation are much less creative, much more automatic,than in the former situation--and this because the symbols he hears are already expressed in a meaningful configuration of relations. Yet there is a danger in carrying this present line of reasoning too far. If it is true that symbolic meanings take part of their meaning from and within the context in which they are used, then a receiver must to some extent be striving to ascertain what precise meaning

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[5]The communication of symbolic meanings by evoking meaning responses in receivers is a very common conception of the process. Its use here is more one of illustration and example than any new use of the conception.

a symbolic vehicle conveys within a particular conceptual framework. This after all was the point of emphasizing that the distinguishing characteristic of symbolic meaning is not its explicitness of reference but its preciseness of meaning and the versatility it allows in using that meaning. The precise meaning used is required to be comprehended by means of the contextual realtions a symbolic vehicle has with a conceptual framework taken as a whole.[6]

Although more could be said concerning the above conception of communication (in the way of relating it specifically to the preceeding discussion of understanding), further attention should be given to the scope of communicative situations to which it is intended to apply. Indication has been given at times that what has been said of the communication of conceptually structured understandings is not so narrowly conceived that some things said of it could not also, in some ways, be applied to other types of communicative situations. However, the focus of the discussion has been intended to apply only to these somewhat ideal situations wherein one person can be presumed to have a symbolically structured understanding and the intent of communicating it to another individual. Also, under the ideal conditions intended to apply, it should be possible to assume that the receiver is making a real effort to understand the speaker. Examples might be a teacher lecturing to a biology class on the subject of evolution or a history professor exploring causes for the First World

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[6]Such consideration of symbolic meanings in context, of course, in some way involves prediction of an unfolding context in an on-going discourse. Prediction of this type might be accounted for in terms of the redundancy of language, e.g., the likelyhood of occurrance of the next word in a sentence--or at least the next word type: noun, verb, adjective, etc., as predictable from grammatical structure.

War, etc.

Oddly enough we cannot include a mathematics or science teacher where their discourse might include the communication of mathematically structured conceptual frameworks. While we have used discussions from the philosophy of science throughout the present work, the treatment given to symbolic meanings has not included numerical concepts. Thus the present formulation of the nature of human understanding is not complete enough as it presently stands to apply to mathematical thought. To in any way deal adequately with understandings mediated by numerical concepts would require a detailed discussion of such concepts.

Instead of doing this (since such a discussion would necessarily be rather long in length and in excess of present needs in discussing the nature of conceptually structured understandings), something of the opposite approach was taken. Use was made of work already done along lines of explaining the nature of scientific understanding in applying it to the problem of obtaining a workable conception of everyday understanding. Fortunately, however, most of what would be needed in the way of explicating the nature of mathematical understandings has already been done by Cassirer and Hawkins. It therefore seems reasonable to assume that, once the needed explication of numerical concepts was included, the above formulation could be extended to include the transfer of mathematical conceptual structures as well.

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